



# CO<sub>2</sub> Capture and Utilization from a Power to Products Lens

ARPA-E Reactive Carbon Capture Workshop (Day 2 - Feb 3, 2022)

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# Dense Energy Carriers (DEC) Program – Key Thrusts & Mission

*Delivering net-zero emission carbon-based fuel synthesis options*



Photons → X

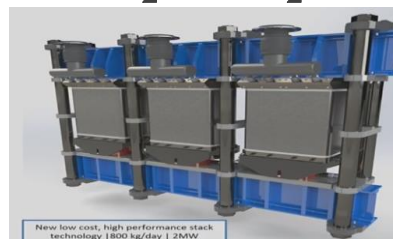
## Focus areas

photons → e<sup>-</sup>



Low-cost renewable sources of power for electrification & conv.

H<sub>2</sub>O → H<sub>2</sub>



Develop deep understanding of green H<sub>2</sub> production

Air → CO<sub>2</sub>



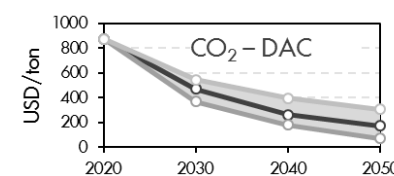
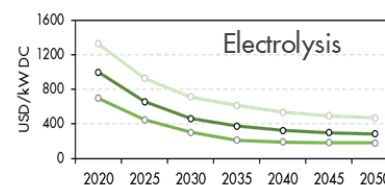
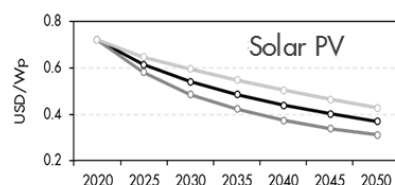
Net-zero emissions carbon source for clean HC fuels

CO<sub>2</sub> → X

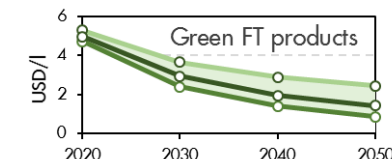


Deliver economical CO<sub>2</sub> conversion technologies

## Forecasting\*

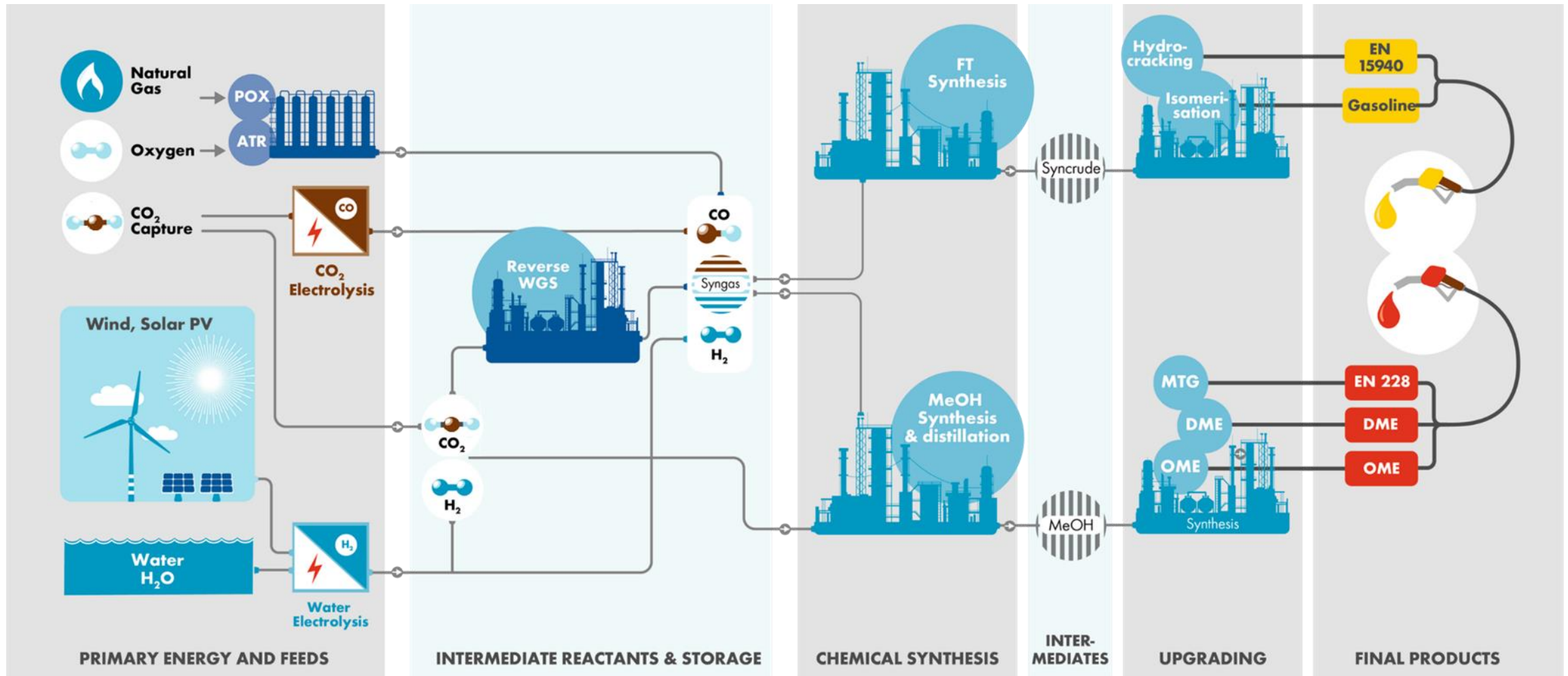


**Min {green premium}**





# Manufacturing Dense Energy Carriers



# A Real-World Application of Our Work – 500 L of Sustainable Aviation Fuel Made from CO<sub>2</sub> and Green H<sub>2</sub>



Amstelveen, 08 February 2021

World first in the Netherlands by KLM, Shell and Dutch ministry for Infrastructure and Water Management: first passenger flight performed with sustainable synthetic kerosene

For the first time worldwide, a passenger flight partly flown on sustainably produced synthetic kerosene, was carried out in The Netherlands. This was announced today during the international conference on Synthetic Sustainable Aviation Fuels (SAF) in The Hague. Shell, producer of the sustainable kerosene and KLM, operating the flight, presented this showcase during the meeting initiated by Cora van Nieuwenhuizen, Dutch Minister for Infrastructure and Water Management. European politicians, policymakers, representatives from the business community, the (aviation) industry and NGOs participated at the conference.

